



IB MYP YEAR 5
ASSESSMENT TASK
A Broad-based Test

Subject:	Y9 <i>Standard</i> Mathematics	Name : (Class)	<i>Ryan Casberg</i> (Y9 Trkst)
Assessment:	Broad-based Test		
Date of assessment:	8 th June, 2012		

- This task assesses Criteria A and C;
- Time allowed – *1 hour and 30 mins*;
- You must answer all the questions;
- Write your answers in the spaces provided;
- Show all of your working – not just the answer
- Scientific Calculator is allowed.

Criterion A		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Students are reasonably successful with the Part A questions only. Any errors here are relatively minor.	The student generally makes appropriate deductions when solving simple problems in familiar contexts.
3-4	Students are successful with Part A questions. The only errors in part B questions are minor.	The student generally makes appropriate deductions when solving more complex problems in familiar contexts.
5-6	Students are successful with Part A and B questions. The only errors in part C questions are minor.	The student generally makes appropriate deductions when solving challenging problems in a variety of familiar contexts.
7-8	Students are successful with Part A, B and C questions. The only errors in part D questions are minor.	The student consistently makes appropriate deductions when solving challenging problems in a variety of contexts including unfamiliar situations.

Criterion C		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Very little working is shown, and/or the steps shown are confusing. Only the most basic mathematical symbols are used with accuracy.	The student shows basic use of mathematical language and/or forms of mathematical representation. The lines of reasoning are difficult to follow .
3-4	The working shown is generally adequate. Only a few errors in symbols/terminology are evident. It is reasonably easy to follow a student's logic/reasoning.	The student shows sufficient use of mathematical language and forms of mathematical representation. The lines of reasoning are clear though not always logical or complete . The student moves between different forms of representation with some success .
5-6	There are very few, if any, errors in symbols/terminology. All steps in calculations are shown in their completeness. It is easy to follow all the student's logic/reasoning.	The student shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are concise, logical and complete . The student moves effectively between different forms of representation.

Part A (Level 1-2 Questions)

1. Factorize the following

a. $x^2 - 16x$

$$x^2 - 4x^2$$

$$= (x+4x)(x-4x)$$

Answer

(a)

$$\dots \cancel{(x+4x)(x-4x)}$$

b. $x^2 - 16$

$$\left. \begin{array}{l} x^2 - 4^2 \\ (x+4)(x-4) \end{array} \right\} \begin{array}{l} a^2 - b^2 \\ = (a+b)(a-b) \end{array}$$

Answer

(b)

$$\dots \cancel{(x+4)(x-4)}$$

c. $x^2 + 3x - 28$

Answer

(c)

$$\dots \cancel{(x+7)(x-4)}$$

2. Consider a set of data 11cm, 15cm, 19cm, 8cm, 9cm, 12cm, 13cm, 15cm, 17cm and 12cm.

a. Find the mean of this set of data.

$$\frac{11 + 15 + 19 + 8 + 9 + 12 + 13 + 15 + 17 + 12}{10}$$

Answer

(a)

$$\dots \cancel{13.1}$$

b. Find the median of this set of data.

$$\frac{12 + 13}{2}$$

Answer

(b)

$$\dots \cancel{12.5}$$

c. Find the mode of this set of data.

$$\frac{9 + 21}{2}$$

Answer

(c)

$$\dots \cancel{15 \text{ cm}}$$

Part B (Level 3-4 Questions)

3. In Ivan's family, there are 8 members, including Ivan himself, his father, mother, grandmother, 2 elder brothers, 1 elder sister and 1 younger sister. If a person is chosen at random, find the probabilities of the following events happening.

a. Ivan's elder brother is chosen.

Answer

(a)

$\frac{2}{8} = \frac{1}{4}$

b. A male is chosen.

$4 \text{ male} / 8 \text{ members} = \frac{4}{8} = \frac{1}{2}$

Answer

(b)

$\frac{1}{2}$

4.

a. Show that $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$

Answer

(a)

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b. If $\cos \theta = \frac{1}{5}$, find the value of $\cos^2 x - \sin^2 x$

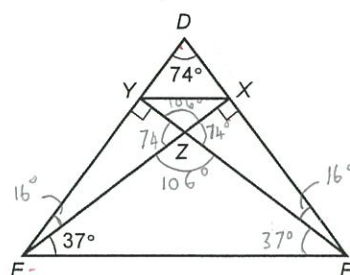
Answer

(b)

.....

Part C (Level 5-6 Questions)

5. In the figure, DYE and DXF are straight lines. EX and FY are the altitudes of $\triangle DEF$ on DF and DE respectively, and they intersect at Z . $\angle EDF = 74^\circ$ and $\angle XEF = 37^\circ$.



- a. Prove that $\triangle DEF$ and $\triangle ZEF$ are isosceles triangles.

$$\triangle DEF: \angle EDF = 74^\circ \text{ (given)}$$

$$90^\circ = \text{Altitude} \rightarrow \angle EFX = 37^\circ + 90^\circ = 127^\circ \text{ (L sum of } \triangle)$$

$$\angle F = 180 - 127$$

$$\angle EFX = 53^\circ$$

$$\triangle EDF = 74 + (53 - 37) + 37 + 53 = 180$$

$$= 74 + (16 + 37) + 53 = 180$$

$$\therefore 53 + 53 + 74 = 180 \text{ (L sum of } \triangle)$$

$\therefore \triangle DEF$ is an isosceles triangle.

$$\triangle ZEF:$$

$$\angle XEF = 37^\circ \text{ (given)}$$

$$\angle EXF = 90^\circ - \text{Altitude of } \triangle EDF$$

$$\angle YEZ \cong \angle XFZ \text{ (Vert opp. } \angle s)$$

$$106 + (53 - 16) + (53 - 16) = 180$$

$$\therefore 106 + 37 + 37 = 180 \text{ (L sum of } \triangle)$$

$\therefore \triangle ZEF$ is an isosceles triangle.

- b. Prove that $EF \parallel YX$.

EX is an Altitude of $\triangle DEF$ (given)

FY is an Altitude of $\triangle DEF$ (given)

$$\triangle YZE = 90^\circ + 16^\circ + Z = 180 \text{ (L sum of } \triangle)$$

$$Z = 180 - 106$$

$$= 74^\circ$$

$\therefore \angle FZX$ is also 74° (vert. opposite $\angle s$)

$$\triangle EZF = 37 + 37 + Z = 180 \text{ (L sum of } \triangle)$$

$$Z = 180 - 74$$

$$Z = 106^\circ$$

$\therefore \angle YZX$ is also 106° ($\angle s$ at a point)

$$= 74 + 106 + 74 + 106 = 360$$

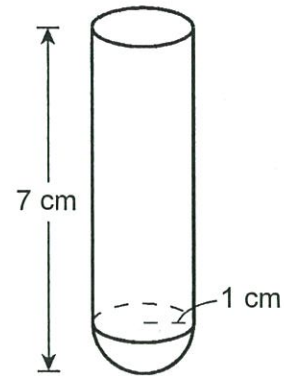
$$\therefore \triangle EYZ \cong \triangle FXZ$$

$$\angle YZX = \angle ZFX \text{ (Vert opp } \angle s)$$

$$\therefore YX \parallel EF$$

\sim line YX is parallel to line EF .

6. The figure shows a solid composed of a right cylinder and a hemisphere. The height of the solid is 7 cm and the base radius of the cylinder is 1 cm.



- a. Find the volume of the solid.

(Express your answers in terms of π .)

$$\begin{aligned}\text{Volume of a sphere} &= \frac{\frac{4}{3} \times \pi \times 1^3}{2} \\ &= 0.66666\dots\pi\end{aligned}$$

$$\begin{aligned}\text{volume of a cylinder} &= \pi \times 1^2 \times (7-1) \\ &= 6\pi\end{aligned}$$

$$\therefore 0.66666\dots\pi + 6\pi =$$

Answer (a) 6.66666667π

- b. Find the total surface area of the solid.

(Express your answers in terms of π .)

$$\begin{aligned}\text{surface area of sphere} &= \frac{4\pi r^2}{2} \\ &= \frac{4 \times 1}{2} \\ &= 2\pi\end{aligned}$$

$$\begin{aligned}\text{surface area of a cylinder} &= 2 \times \pi \times r \times h \\ &= 2 \times 6 \\ &= 12\pi\end{aligned}$$

$$\begin{aligned}\therefore 12\pi + 2\pi &= 14\pi \\ \therefore \text{The total surface area of the solid is } 14\pi\end{aligned}$$

Answer (b) 14π

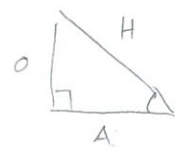
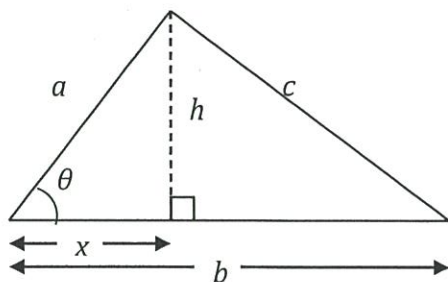
$$\sin = \frac{O}{H}$$

$$\cos = \frac{A}{H}$$

$$\tan = \frac{O}{A}$$

Part D (Level 7-8 Questions)

7. Given a triangle:



For questions a – d, write equations that:

a. relates: a , h , and x

b. relates: x , a and θ

c. expresses c^2 in terms of x , b and h

d. Using equations above, show that $c^2 = a^2 + b^2 - 2ab \cos \theta$

Answer (a) $a^2 + b^2 = c^2$ - pyth. Thrm.
 $= a^2 = h^2 + x^2$

Answer (b) $\cos \theta = \frac{x}{a}$

Answer (c)

8. Given the points A(2,R), B (1,1) and C (4,3)

a. Find the distance between B and C

$$\sqrt{(1+4)^2 + (1+3)^2}$$

$$= \sqrt{5^2 + 4^2}$$

$$= \sqrt{41}$$

$$= 6.40$$

Answer (a)

$$6.40$$

b. Find the equation of the line passing through B and C

$$\text{mid point} = \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

$$\frac{1+4}{2}, \frac{1+3}{2}$$

$$= \frac{5}{2}, \frac{4}{2}$$

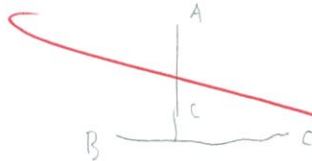
$$= (2.5, 2)$$

Answer

(b)

$$(2.5, 2)$$

c. If the line AC is \perp to BC, find the value of R



Answer

(c)

d. Find the $\angle ABC$

Distance of A to B

$$\sqrt{(1+2)^2 + (1+R)^2}$$

$$= \sqrt{3^2 + 1+R^2}$$

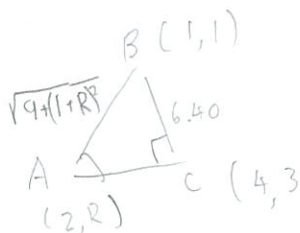
$$= \sqrt{9+(1+R)^2}$$

$$= \sin \theta = \frac{6.40}{\sqrt{9+(1+R)^2}}$$

Answer

(d)

$$\sin \theta = \frac{6.40}{\sqrt{9+(1+R)^2}}$$



--The End of Paper---